1. CHNOPS- most common elements in all living maer
2. Bonds- ionic (transfer electrons), covalent (sharing- polar/ unequal sharing and non-polar/equal sharing), hydrogen (weak bonds between hydrogen and negavely charged items), hydrophobic interacons (how non-polar compounds congregate together- lipids)
3. pH
    1. acid-base/ 0-14, # of H ions determines scale
    2. blood- 7.4, stomach- 2, small intesne- 8; enzymes are specific to pH
4. Water properes - polarity, cohesion(aracon to other water molecules), adhesion (aracon to other charged compounds) low density when frozen, versale solvent, high heat of fusion/vaporizaon; surface tension

Organic molecules - monomers are simplest form of all; monomers join together via dehydraon synthesis (loss of water) to make polymers; polymers are broken down via hydrolysis (input of water)

Carbohydrates- CHO 1:2:1 rao, monomer= monosaccharides, 2=disaccharides, 3 or more= polysaccharides

- Used for energy (cell respiraon)

Lipids – C, H, O (not a 1:2:1 rao) *P only in phospholipids

1. Saturated fats have single bonds between carbons, unsaturated fats have at least one double bond between carbons (kinky); plants make polyunsaturated; animals make monounsaturated
2. Uses- in all membranes; stored energy, protecon, insulaon, myelin sheath of nerves

1. Proteins- C, H, O, N (may have other elements in R group)
    1. Monomer- amino acids (20 total types), 2=dipepde, 3 or more= polypepde
    2. Parts of amino acid= carboxyl group (COOH) on one end, amino group on the other end (NH2), central carbon and variable R group (can be hydrophobic or hydrophilic) which determines chemical properes.
    3. Protein Folding- shape determines funcon; primary= a.a. chain; secondary= beta pleated sheet or alpha helix (hydrogen bonds); terary=globular; folds in on itself (disulfide bridges, hydrogen bonds, hydrophobic interacons; ionic bonding); quartenary= more than one polypepde.

1. Nucleic acids – C, H, O, N
    1. Monomer= nucleode, 2 = dinucleode, 2 or more polynucleode
    2. Nucleode made up of sugar, phosphate and base
    3. Used to store genec informaon
    4. DNA is double stranded, has deoxyribose, A, G, C, T
    5. RNA is single stranded, has ribose, A, G, C, U
    6. mRNA- copies genec message; rRNA- aaches mRNA and makes up ribosomes (most common);tRNA- carries amino acids; DNA- carries genec code

Enzymes

1. Biological catalysts (made of protein) that speed up rate of chemical reacons by lowering acvaon energy required for reacon to occur
2. Enzyme has acve site (exposed R groups) where reacon occurs
3. Enzymes can break down substance (catabolic reacon) or build up substances (anabolic)
4. Enzyme/substrate complex is formed
5. Substrate is what enzyme acts on
6. Rate is determined by collisions between substrate and enzyme

8) Enzyme is specific to substrate; the substrate must be complementary to the surface properes (shape and charge) of the acve site (which is made up of R groups with specific chemistry, i.e. hydrophobic).

9) Enzyme rate is affected by:

- **pH** (opmal for each enzyme),
- **temperature** (opmal for each enzyme but in general increased temp means increased collisions so rate goes up inially; too much heat can denature enzyme), enzyme concentraon (more enzyme faster rate or vice versa)
- **substrate concentraon** (more substrate faster rate; v_{max} is fastest enzyme can work when saturated)

10) Inhibion-compeve inhibion (something competes for acve site; can be overcome with more substrate)

11) Non-compeve inhibion- aaches at allosteric site and changes shape of enzyme so it is not funconal; cannot be overcome with more substrate

12) Coenzymes (organic; NAD and vitamin B etc.) and cofactors (inorganic; zinc, magnesium etc.) interact with enzymes to put them into the right structure to do work.